same direction without sacrifice of strength. Necessarily there must be a sufficient margin to secure both strength and endurance in the motive power of steamships. Existing arrangements are the outgrowth of large experience, and new departures must be carefully scrutinised.

The use of rotary engines, of which Mr. Parsons' turbo-motor is the leading example at present, gives the prospect of further economies of weight. Mr. Parsons is disposed to think that he could about halve the weights now required for the engines, shafting, and propellers of an Atlantic liner while securing proper strength and durability. If this could be done in association with the use of water-tube boilers it would effect a revolution in the design of this class of vessel, permitting higher speeds to be reached without exceeding the dimensions of existing ships.

It does not appear probable that, with coal as the fuel, water-tube boilers will surpass in economy the cylindrical boilers now in use; and skilled stoking seems essential if water-tube boilers are to be equal to the other type in rate of coal consumption. The general principle holds good that as more perfect mechanical appliances are introduced, so more skilled and disciplined management is required in order that the full benefits may be obtained. In all steamship performance the "human factor" is of great importance, but its importance increases as the appliances become more complex. In engine-rooms the fact has been recognised and the want met. There is no reason why it should not be similarly dealt with in the boiler-rooms.

Liquid fuel is already substituted for coal in many steamships. When sufficient quantities can be obtained it has many obvious advantages over coal, reducing greatly manual labour in embarking supplies, conveying it to the boilers and using it as fuel. Possibly its advocates have claimed for it greater economical advantages over coal than can be supported by the results of extended experiment. Even if the saving in weight for equal evaporation is put as low as 30 per cent. of the corresponding weight of coal, it would amount to 1000 tons on a first-class Atlantic liner. This saving might be utilised in greater power and higher speed, or in increased load. There would be a substantial saving on the stokehold staff. At present it does not appear that adequate supplies of liquid fuel are available. Competent authorities here and abroad are giving attention to this question, and to the development of supplies. If the want can be met at prices justifying the use of liquid fuel, there will undoubtedly be a movement in that direction.

Stronger materials for the construction of hulls are already available. They are, however, as yet but little used, except for special classes of vessels. Mild steel has taken the place of iron, and effected considerable savings of weight. Alloys of steel with nickel and other metals are now made which give strength and rigidity much superior to mild steel, in association with ample ductility. For destroyers and torpedo boats this stronger material is now largely used. It has also been adopted for certain important parts of the structures of recent ships in the Royal Navy. Of course the stronger material is more costly, but its use enables sensible economies of weight to be made. It has been estimated, for example, that in an Atlantic liner of 20 knots average speed about 1000 tons could be saved by using nickel steel instead of mild steel. This saving would suffice to raise the average speed more than a knot, without varying the dimensions of the ship.

Alloys of aluminium have also been used for the hulls or portions of the hulls of yachts, torpedo-boats, and small vessels. Considerable savings in weight have thus been effected. On the other hand, these alloys have been seriously corroded when exposed to the action of sea-water, and on that account are not likely to be extensively used. Other alloys will probably be found which will be free from this defect, and yet unite lightness with strength to a remarkable degree.

Other examples might be given of the fact that the metallurgist has by no means exhausted his resources, and that the shipbuilder may look to him for continued help in the struggle to reduce the weights of floating structures.

It is unnecessary to amplify what has already been said as to possible increase in the efficiency and types of propellers. With limited draught, as speeds increase and greater powers have to be utilised, multiple propellers will probably come into use. Mr. Parsons has shown how such problems may be dealt with; and other investigators have done valuable work in the same direction.

In view of what has happened and is still happening, it is practically certain that the dimensions of steamships have not yet attained a maximum.

Thanks to mechanical appliances, the largest ships built or to be built can be readily steered and worked. In this particular difficulties have diminished in recent years, notwithstanding the great growth in dimensions.

Increase in length and weight favour the better maintenance of speed at sea. The tendency, therefore, will be to even greater regularity of service than at present. Quicker passages will to some extent diminish risks, and the chance of breakdown will be lessened if multiple propellers are used. Even now, with twin screws, the risk of total breakdown is extremely small.

Whatever may be the size and power of steamships, there must come times at sea when they must slow down and wait for better weather. But the larger and longer the vessel, the fewer will be the occasions when this precaution need be exercised.

It must never be forgotten that as ships grow in size, speed, and cost, so the responsibilities of those in charge increase. The captain of a modern steamship needs remarkable qualities to perform his multifarious duties efficiently. The chief engineer must have great powers of organisation, as well as good technical knowledge, to control and utilise most advantageously the men and machinery in his charge. Apart from the ceaseless care, watchfulness and skill of officers and men, the finest ships and most perfect machinery are of little avail. The "human factor" is often forgotten, but is all-important. Let us hope that in the future, as in the past, as responsibilities increase so will the men be found to bear them.

NOTES.

A STATUE, erected in memory of the late M. F. Tisserand, will be unveiled at Nuits-Saint-Georges on October 15.

MAJOR RONALD ROSS has sent Mr. A. L. Jones a letter from Sierra Leone on his investigations into the cause of malaria. In the course of the communication he says:—We have now practically finished our work here. We have found—(*a*) that local species of Anopheles (mosquitoes) carry malaria; (*b*) that these species breed in a few stagnant puddles. For many scientific reasons we have come to the conclusion that the truly malarial fever is caused here solely by the mosquito—probably entirely by the Anopheles species. We estimate then that most of the malarial fever here can be got rid of at almost no cost except of a little energy on the part of the local authorities.

A SUCCESSION of earthquake shocks occurred on Monday night, September 25, in the district of Darjeeling, involving great loss of life and damage to property. No details as to the exact times of the shocks have been received. The earthquake was accompanied by a remarkable rainfall, and was followed by extensive landslips. It is reported that in twenty-four hours over 20 inches of rain fell, and in all 28 inches fell in thirty-eight hours.

THE associate editorship of the *American Journal of Science*, vacant by the death of Prof. Marsh, has been taken up by Prof. L. V. Pirsson, of Yale College.

IN a report just issued on metalliferous mines in the North Wales district, Dr. C. Le Neve Foster refers to the fact that several foreign companies have lately purchased mines in that district with the object of reworking them. He remarks:—"Though I welcome the advent into Wales of the famous Vieille Montagne Company, for I have hopes that its methods of mining and dressing will form useful object-lessons to us, I am not blind to the slur which is cast upon us as a mining nation. If such a capable body of commercial men as the directors of the Vieille Montagne Company propose to resuscitate some of our abandoned mines, it may be taken for granted that they consider the enterprise as likely to be profitable. Is our mining talent so far behind the times that foreigners can make a profit out of mines which we have abandoned as worthless? If so, the technical skill of continental mining engineers is of a higher nature than that of our own people, and we are not keeping pace with the times. It therefore behoves us as a nation to get out of the groove of the slovenly old-fashioned methods of working ore mines, which linger so long in this country, and to give our mining superintendents and mining foremen such technical training as will render them at least the equals of their continental competitors." It is to be hoped that this note of warning will lead British mining companies to make use of the resources which modern science has placed at their disposal.

THE *Journal* of the Society of Arts announces that among the prizes offered by the French Société d'Encouragement pour l'Industrie Nationale, open to all the world except members of the administrative council, and to be awarded next year, are the following:—Two thousand francs (80*l.*) for a publication useful to the chemical or metallurgical industry, a treatise on metallurgical chemistry summarising the works that have appeared on the subject during the last twenty years being invited; two prizes of 500 francs (20*l.*) each for scientific chemical researches the results of which are useful to industry, the authors not being required to have realised the practical applications which they may foresee as resulting from their observations; 2000 francs (80*l.*) for the scientific study of an industrial process the theory of which is still imperfectly known, the methods that permit of obtaining a given result being often known long before the nature of the phenomena is suspected, and yet the knowledge of which has great interest as regards reducing the number of empirical trials necessary for realising fresh improvements; and 3000 francs (120*l.*) for the production of permanent magnets, the qualities expected from which are power and stability. The models, papers, descriptions, &c., must be sent in before December 31 to the Secretary of the Société d'Encouragement, 44 Rue de Rennes, Paris.

THE death is announced of Mr. Edward Case, the author of a paper on "The Dymchurch Wall and Reclamation of Romney Marsh," read at the recent meeting of the British Association. For many years Mr. Case was a superintending engineer in the Public Works Department in Ceylon. Of late he gained distinction in the engineering world by his investigations of the problem of sea defence, and by the results which he had obtained on a variety of shores.

THE Funafuti Boring Expedition has very recently led to the rectification of a common ethnographical error, and the discovery of an interesting fact in zoo-geography. In the Monograph on the Atoll of Funafuti published by the Australian Museum, Sydney (part iii. 1897, p. 199) Mr. E. R. Waite referred to a large undetermined fish known to the natives as "Palu," and to traders as "Oil-fish." According to Mr. Louis Becke, a full-grown Palu would weigh up to 150 lbs. and be 6 feet long; the average size is about 3 or 4 feet, and weight 40 to 60 lbs. The natives have many superstitions in regard to Palu; every portion of it is edible, even the head and bones when cooked turning into a rich mass of jelly. The flesh of the Palu, if left uncooked, never putrefies; it simply dissolves into a colourless and odourless oil. Perhaps the great regard the natives have for it is due to the fact of its being a rapid and powerful purgative. It is a deep-water fish, and is usually caught at a depth of from 120 fathoms down to 200 fathoms; the fishing is only done at night. The Palu fishing-hook has been described by Mr. C. Hedley (*l.c.* part iv., 1897, p. 272), who points out that this large hook, which is widely distributed in the Central Pacific, and may be seen in most ethnographical collections, has been described by all authors as a "shark-hook." The last expedition to Funafuti has been fortunate enough to obtain a specimen of this fish, and in an appendix (part ix., 1899, p. 539) Mr. Waite has solved the riddle, and found that this mysterious fish is the well-known *Ruvettus pretiosus*, which hitherto was known only from the North Atlantic, and whose recorded range is now enormously increased. The Escolar (Atlantic name) has been taken at depths as great as 300 and 400 fathoms, but can be taken only at night in September and the early part of October.

WE learn from the September number of *Annalen der Hydrographie* that the Deutsche Seewarte, in conjunction with the Berlin Meteorological Office, proposes to issue a ten-day report, containing values of barometric pressure, air-temperature and rainfall for, say, one hundred stations between the west coast of North America and the east coast of Asia, accompanied by a map showing observations taken on board German ships traversing the North Atlantic. The report would be issued as a supplement to the *Daily Weather Bulletin*, about twenty days after date. The success of the proposal will to a great extent depend upon the willingness of other countries to furnish ten-day means for some selected stations in their respective systems.

WE have received from Dr. W. Doberck, Government Astronomer, Hong Kong Observatory, his annual report for 1898. The "Observations and Researches" contain synopses of fifteen years' meteorological and magnetic observations and a number of very useful tables relating to the climatology of the Colony.

THE papers read at the ninth annual general meeting of the Museums Association, held in Sheffield in July of last year, are contained in the "Report of Proceedings," just published by Messrs. Dulau and Co. All the subjects dealt with are of interest to every one concerned in museum work, among them being: the relation of museums to elementary education; the arrangement of museum herbaria, the electric light installation at the Manchester Museum, the exhibition of museum specimens, the mounting of marine animals as transparencies for museum purposes, the ethnological arrangement of archæological material, and some Russian museums. Mr. Herbert Bolton, the editor of the volume, calls attention to the need for a complete report or directory of museums in the United Kingdom, and rightly remarks that "the publication of such a report, and its annual revision, would tend to bring museums into close union and to a common knowledge of each other." It is pointed out that the preparation of an annual report of this character might be undertaken by a committee of the British Association; and this suggests that it would be worth considering whether the Museums Association itself might not with advantage become part of the British Association, in much the same way as the Corresponding Societies are at present. The multiplication of annual meetings would thus be avoided, and excellent opportunity would be afforded for the discussion of the various aspects of museum work.

IN No. 4 of vol. i. of the "Geological Series" of the Field Columbian Museum Mr. Elmer S. Riggs treats of the Mylagaulidæ, an extinct family of rodents of which two new genera are described. It is remarked that the one prominent feature in these animals is the unusual development of the premolar to the exclusion of the posterior-lying teeth, evincing unusual capacity for crushing or grinding. A fossil egg from South Dakota is described in No. 5, by Dr. Oliver C. Farrington. The specimen is about 2 inches long by 1½ inches. Covering most of the exterior is a thin black layer ·017 of an inch in thickness, and resembling an eggshell. The mass of the specimen is chalcedony, and this contains a white opalescent ovoid mass which appears to correspond with the yolk, and to yield evidence of organic matter. In shape this petrified egg resembles that of the Florida duck.

THE jumping-mice of the genus *Zapus* form the subject of part 15 of the "North American Fauna," edited by Dr. Merriam. It is noteworthy that whereas Dr. Coues in 1877 recognised but a single representative of this genus, ranging over a large area in North America, Mr. Preble, the author of the present memoir, considers himself justified in distinguishing no less than twenty North American species and sub-species, in addition to one Old World form recently described from Szechuan. The discovery of the Szechuan species adds one more link in the chain connecting the fauna of North-eastern Asia and North America; and when Manchuria and Mongolia are fully explored, representatives of the genus may be looked for in those countries.

ANOTHER important contribution to our knowledge of the North American mammal fauna is afforded by Dr. Allen's revision of the squirrels inhabiting the area north of Mexico, published in the August number of the *American Naturalist.* The last revision was in 1877, when six species and seven sub-species were recognised; Dr. Allen now admits ten species, with a large number of sub-species. With Mr. Nelson's revision of the species inhabiting Mexico and Central America, the group is now placed on a satisfactory footing, except as regards South America. Interesting results have been obtained by both writers as regards the effects of temperature and humidity on the coloration of members of the group. "In the drier interior mountains," for example, "certain sub-species of a group will be characterised by dull greyish upper-parts and white under-parts, while other sub-species of the same group inhabiting humid mountains near the coast will have nape and rump-patches sharply contrasting with the rest of the dorsal surface and bright ferruginous under-parts; increased humidity within the tropics being usually accompanied by increased intensity of coloration." This is zoology in its best sense.

A NOTEWORTHY addition to the fauna of the Australasian region is afforded by the discovery of a representative of the genus Balanoglossus in the New Zealand seas, since it has hitherto been unknown in the southern hemisphere, as, indeed, was the entire group of the Hemichordata till Mr. T. P. Hill found a species of Ptychodera in 1893. The new Balanoglossus is described by Mr. Benham in the September number of the *Quart. Journ. Microscopical Science*, and presents all the characteristic features of the genus. We may remind our non-zoological readers that Balanoglossus includes worm-like animals which approximate to vertebrates in the possession of a notochordal tract.—The same journal contains an interesting paper by Mr. E. S. Goodrich, of Oxford, on the existence of a communication between the blood-vascular system and the "cœlom" in the common leech.

YET another communication in the journal above quoted cannot be passed over without notice, although, from the extremely technical nature of the subject, such mention must necessarily be brief. The paper in question, which has been awarded the Rolleston Memorial Prize for 1898, is one by Mr. R. Evans, on the structure and metamorphosis of the larva of the common freshwater sponge. The work, which occupied a large portion of the author's time for a period of about eighteen months, was undertaken on the suggestion of Prof. Ray Lankester, and appears to have been admirably carried out. Several types of free-swimming larvæ have been detected, and their mutual relationship determined. From the occurrence of so-called "collar-cells" in sponges, and their early appearance in the free-swimming larvæ, coupled with their absence in all the Metazoa, the author is inclined to believe that the Porifera (sponges) have no relationship with the former group, but are more probably derived independently from primitive flagellate organisms.

IN their report for the year 1898 the Trustees of the Australian Museum, Sydney, deplore the insufficiency of the Government grant for purchase of specimens. It appears that in 1892, when the purchase grant was 1250*l.*, the Colony was passing through a period of financial depression, in consequence of which the vote was reduced in the following year to 200*l.*, this small amount having to suffice for the purchase of books as well as specimens. Although this amount has been slightly increased in the vote for 1898–99, the Trustees point out that it is altogether insufficient for the needs of the institution, so that many specimens are lost to the museum, while collecting has had to be suspended altogether. As the opportunity to acquire many of the ethnological specimens offered will never recur, it is to be hoped that Government, now that the finances of the Colony have taken such a decided turn for the better, may see their way to place the Trustees in a stronger position for carrying out the purposes for which the museum was founded.

MUCH more satisfactory reading than the foregoing is Dr. E. Thurston's report on the Madras Museum for 1898–99 As was fully stated in NATURE for May 26, 1898, the Director has been chiefly occupied in the investigation of the ethnology of the numerous native tribes of the Nilgiri and Anamalai Hills; the results of which are in course of publication in a series of valuable memoirs. Attention is directed in the report to the prospect of acquiring Mr. R. B. Foote's well-known collection of prehistoric Indian implements. It is also satisfactory to learn that the importance of fishery investigations is fully recognised by the Director.

MESSRS. HOLBORN AND DAY send us a reprint from *Wiedemann's Annalen* dealing with their investigations on the air-thermometer at high temperatures, a subject to which attention has been drawn by the recent discussions on platinum-thermometry at the British Association. The authors give comparisons of the results obtained by using containing vessels of platinum, iridium and porcelain respectively in these observations.

FROM Messrs. O. Lummer and E. Pringsheim we have received a copy of their paper on the partition of energy in the spectrum of a black body, published in the *Verhandlungen* of the German Physical Society (1). Experiments are described in which the radiations from an electrically heated cylinder were allowed to fall on a bolometer, and the energy tabulated for different temperatures and wave-lengths, the results being compared with those given by Paschen's formula.

IN the course of a paper on Euclidian geometry, contributed to the *Bulletin de la Classe des Sciences* (Brussels), M. Charles Lagrange remarks that the condition necessary for introducing doubts in geometry, a condition without which no argument exists against the certainty of Euclidian space, would consist in presenting two different admissible definitions of space. Up till now only one definition has been given; and this assumes the existence of Euclidian space. The author considers that the new geometry has in fact established the contrary of what it claimed; it has attempted to throw doubts on the physical reality of the Euclidian postulate, and it has only succeeded in confirming it.

ENGLER AND PRANTL'S great work, *Die natürlichen Pflanzenfamilien* is now completed, as far as flowering plants are concerned, by the publication of Nos. 184–5, completing Parts ii.–v.

PROF. D. G. FAIRCHILD, of the U.S. Department of Agriculture, gives, in the *Botanical Gazette* for August, an interesting sketch of the general features of the flora of Venezuela, derived from his experience as botanist to the expedition fitted out by

Mr. Barbour Lathrop, of Chicago, for the exploration of that country.

IN honour of the 150th anniversary of the birth of Goethe (August 28, 1899), Dr. H. Potonié reprints, from his *Naturwissenschaftliche Wochenschrift*, a treatise on the morphological origin of the leaves of plants. The importance is shown of the part played by Goethe's theory of metamorphosis in the elucidation of problems connected with vegetable morphology, and it is pointed out that the introduction of the term "morphology" itself is due to Goethe.

VOLUME XV., part 7 of the *Nouveaux mémoires de la Soc. Imp. des Naturalistes de Moscou* is chiefly occupied by a monograph of the genus Sphæronema (Ascomycetes) by M. A. Jaczewski. He enumerates and describes seventy-two good specimens of the genus, seventy-seven being rejected as not properly belonging to it, besides eight others, for which a new genus, Pseudographium, is formed. D. Strémonkhoff has also a short paper on the ammonites *Phylloceras zignodianum* and *Lytoceras adelae*, from the schists of Balaclava.

PROF. VERNON L. KELLOGG gives an interesting account, in the *American Naturalist* for August, of the Hopkins Sea-side Laboratory on the Bay of Monterey, connected with the Leland Stanford Junior University. Monterey Bay and the Bay of Naples are stated to be much alike in the abundance and representation of species. The Bay is a middle point between the north and south zones of the Pacific coast. The regular sessions of the laboratory are held in June and July of each year; but investigators and students working without instruction may continue their work though the summer. Courses of lectures are given in general zoology, embryology and cryptogamic botany.

PRACTICAL directions for stuffing and setting up birds are given in "Bird Stuffing and Mounting," the fifth edition of which has been published by Messrs. J. and W. Davis, Dartford. To students of natural history and collectors this practical manual of taxidermy should be of service.

IN connection with the Parents' National Education Union, a course of lectures to young people will be delivered by Mr. Cecil Carus-Wilson at the Horbury Rooms, Notting Hill Gate, during this month and next. The titles of the lectures are "The Wonders of Rain," "Ice and Glaciers," "The Mighty Ocean," "Volcanoes and Geysers." The aim will be to interest and entertain children by directing their attention to the natural phenomena which surround them, and upon which the studies of geography, geology and physiography are based.

THE additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus*, ♂) from India, presented by Dr. Montgomery Smith; an African Civet Cat (*Niverra civetta*) from West Africa, presented by Mr. W. H. Hardwick, R.N.; a Two-spotted Paradoxure (*Nandinia binotata*) from West Africa, presented by Mr. F. Gordon; a Black-backed Kaleege (*Euplocamus melanonotus*, ♀), two Sonnerat's Jungle Fowls (*Gallus sonnerati*, ♀ ♀), a Wood Francolin (*Francolinus gularis*) from India, presented by Mr. W. F. Pedler; four Green Lizards (*Lacerta viridis*), European, presented by Mr. F. K. Preston; two Black-eared Marmosets (*Hapale penicillata*) from South-east Brazil, a Hocheur Monkey (*Cercopithecus nicticans*), a Ruppell's Parrot (*Paeocephalus rueppelli*) from West Africa, a Maroon Oriole (*Oriolus trailii*) from India, two Radiated Tortoises (*Testudo radiata*) from Madagascar, deposited.

OUR ASTRONOMICAL COLUMN.

NEW ALGOL VARIABLE IN CYGNUS.—The following *minima* occur at convenient times for observation during October:—

$$\text{D.M.} + 45^\circ{\cdot}3062. \left\{\begin{array}{l}\text{R.A. 20h. } 2{\cdot}4\text{m.}\\ \text{Decl. } + 45^\circ\ 53'\end{array}\right. (1855)$$

		d.	h.	m.			d.	h.	m.
1899.	Oct.	5	8	43	1899.	Oct.	23	15	43
,,	,,	14	12	13	,,	,,	28	5	28

STELLAR PARALLAX.—M. Osten Bergstrand, of the Upsala Observatory, has recently been engaged in measuring photographic chart plates to determine any possible evidence of stellar parallax (*Astr. Nach.*, Bd. 150, No. 3593). The photographs were taken with the photographic refractor of 33 cm. aperture and 4·33 metres focal length during 1897 and 1898, all the measures being made with a Repsold micrometer in conjunction with a "reseau" by Gautier. After describing the method of measurement adopted, the following values for parallax are given:—

Star.	Parallax.	
Σ 1516 A. ...	+ 0″·080 ± 0″·011. ...	From measures of *four* comparison stars on *fourteen* plates.
A Oe. 11677....	+ 0″·192 ± 0″·013. ...	From measures of *eight* comparison stars on *nine* plates.

The latter star is remarkable as having a very large proper motion—about 3″ annually.

PRECESSION TABLES.—We have received a volume compiled by Dr. Downing, superintendent of the English Nautical Almanac, containing a series of tables which have been constructed so as to give the values of the precessions corresponding to Newcomb's value of the Precessional Constant, as deduced by him in accordance with the request made to him at the International Conference on Fundamental Stars, held in Paris in May 1896. Prof. Newcomb's original results are published in the Astronomical Papers of the American Ephemeris, vol. viii. part i. The present tables are constructed for Epoch 1910·0, but the method of setting out is such that they can be used with facility for at least ten years before and after that date.

LONGITUDE FROM MOON CULMINATIONS.—In a communication to the Royal Astronomical Society (*Monthly Notices*, R.A.S., vol. lix. p. 513, May 1899), Mr. D. A. Pio, of Syra, Greece, brings forward a new method of determining local longitude. The determination of culmination is only undertaken to give the precise instant of the moon's transit across the local meridian, thereby obviating the necessity of an accurately adjusted transit instrument with the many precautions connected with it. The instruments required are a sextant, artificial horizon, and a well-rated chronometer, together with the usual tables. Instead of finding the right ascension of the moon directly as usual, the author obtains it indirectly by finding the mean local time of meridian passage, converting to sidereal time, and then adding the right ascension of the mean sun at local transit. The difficulty of finding the mean local time of transit is got over by observations of equal altitudes, the resulting *time of culmination* requiring to be corrected to reduce it to *time of transit*. Local mean time is determined by similar measures of equal altitudes of the sun. The difference between the times of transit of sun and moon thus obtained is, of course, the mean local time of the moon's transit. The remaining calculations are precisely similar to the usual method of lunar distances, so that the novelty of the new method consists in the substitution of the use of "equal altitudes" with a sextant for meridian passage with a transit circle; in fact the observation is really a chronometric one. The difference in time between the transits of sun and moon should be correct to the *tenth* of a second, and to facilitate this the two observations should be chosen as near together as possible. The method is stated to be unsuitable for high latitudes. The necessary formulæ for "reduction to meridian" are included in the article, and an example fully worked out to illustrate the exact method of procedure.